

# **Automatic detection of saturation-type artifacts in neurophysiological recordings: Application to human intracranial EEG**

Signal saturation is a type of artifact that occurs when the amplitude of an electrophysiological signal exceeds the range of the acquisition system, resulting in a flat signal at the system's upper or lower limit. If undetected it can compromise subsequent analyses like wave morphology or time-frequency domain analysis.

This work presents a novel algorithm for automatic detection of saturation artifacts in signals based on derivative analysis. The result is an offline artifact detection method capable of detecting saturation not only at the system's limits but also on intermediate values, while distinguishing it from naturally occurring low-variability regions in the signal. We apply this algorithm for the purpose of cleaning intracranial EEG recordings obtained during pre-surgical diagnosis of patients with drug-resistant epilepsy. To achieve a robust performance across heterogeneous databases (different hospitals, patients and seizures) the algorithm computes a different threshold for each channel, below which low-variability intervals are detected as saturation. The algorithm's application to iEEG data from three different hospitals with distinct acquisition systems has yielded a performance of 98% of sensitivity and specificity, while displaying the ability to generalize for different patients, seizures and acquisition systems.